

WESTINGHOUSE ELECTRIC CORPORATION



FRIENDSHIP
INTERNATIONAL AIRPORT
BALTIMORE 27, MD.

23 March 1956

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STAT

SUBJECT: Proposal for Low Altitude Antenna
Contract FL-3011

Dear George:

Attached is a proposed specification for the low altitude antennas applicable to the radar mapping system components previously proposed in our letter of 3 February 1956 as Item 2.

It is proposed to design and fabricate two antennas in accordance with the specification attached; one for right hand installation and one for left hand installation.

Delivery of the two antennas is quoted August 1956. However, effort is being made to effect delivery in July 1956. For this effort Westinghouse submits a fixed price quotation subject to redetermination as set forth in the proposed contract clauses of \$139,649 which includes \$9,136 profit, based on 7% of the estimated cost.

Very truly yours,



Sales Engineer
Air Arm Division

STAT

*Gene Gil Waters let mg.
Mar 28 '56 xcc*

COST ANALYSISCOST ANALYSIS

GENERAL - This analysis includes:

Description Design & Fabricate

1. X Estimated cost for bid Two Antennas.
2. Entire Contract Item No.
3. X G.O. or Neg. No. AAN-30175 Contract No. FL-3011 Bid Date 3/23/56

COST ANALYSIS

A Direct Cost

Dollar Amount

(1) Direct Material

\$ 52,870.

(2) Model Shop Labor 5050 @ \$2.92

14,746. ✓

(3) Model Shop Overhead (75.7% of Item 2)

11,163. ✓

(4) Engineering Labor 5700 @ \$3.19

18,183. ✓

(5) Engineering Overhead (75.7% of Item 4)

13,765. ✓

(6) Drafting Labor 2040 @ \$2.24

4,570. ✓

(7) Drafting Overhead (75.7% of Item 6)

3,459. ✓

(8) Other Items of Direct Cost (Specify)

(9) Subtotal - Items of Direct Cost

\$ 118,756. ✓

B. General and Administrative Expense

(9.9% of Item A (9))

11,757. ✓

C. Estimated Cost Profit

130,513. ✓

D. ~~Estimated~~ Profit (7% of Item 9)

9,136. ✓

E. Other Contract Performance Cost

Total Estimated Cost, including Profit

\$ 139,649. ✓

This is to certify that the information contained in this report has been compiled from the records and books of this Company (or is covering a bid estimate, is based on such books and records), and to the best of our knowledge and belief, the costs and expenses shown herein are correctly stated.

WESTINGHOUSE ELECTRIC CORPORATION

Date 3/23/56By

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Sales Department

March 23, 1956

LOW ALTITUDE ANTENNA SPECIFICATION

Design of Antennas - The antennas shall be identical except that one shall be designed for mounting on the left side of the aircraft and the other shall be intended for right side utilization.

Size and Weight - Each antenna assembly shall be designed for minimum size and weight consistent with the degree of rigidity required in this type of installation. The weight of each antenna shall not exceed 125 pounds. Each antenna shall be mounted in a 24 inch I.D. cylinder.

Description - Each antenna shall consist of a 11.5 foot linear array with slotted waveguide feed and a reflector for beam shaping. Flanges and waveguide shall be compatible with the remainder of the system.

Frequency - The antennas shall be designed for operation within the scatter band of 34512 to 35208 megacycles.

Construction - An extrusion type feed and a honeycomb type reflector shall be employed.

Mounting - The antennas shall be designed for mounting in an unpressurized tube attached to the aircraft.

Pressurizing - Each antenna assembly shall be pressurized as necessary to permit the utilization of maximum RF power of approximately 100KW commensurate with the magnetron ratings at any altitude below 40,000 feet. Pressurization will be supplied from the Radar Mapping System pressure system.

- 2 -

Direction of Peak Intensity - Direction of peak intensity of each antenna pattern shall be 88 ± 2 degrees with respect to the longitudinal axis of the antenna.

Radiation Pattern - Vertical Plane - The pattern of each antenna in the vertical plane shall be optimized to obtain uniform response from similar targets at any ground range between 2 and 15 nautical miles from an altitude of 1000 feet. Amplitude deviations from the optimum curve shall not exceed 1.5 db measured one way. Ground ranges 0-15 nautical miles and amplitude deviations of 1 db shall be held as design objectives.

Radiation Pattern - Horizontal Plane - The pattern of each antenna in the horizontal plane shall not be more than 0.18 degree in beam width at the half power points. Minor lobes shall be at least 12 db down compared to the peak intensity of the overall radiation pattern.

Voltage Standing Wave Ratio - The VSWR of each antenna radiating element together with the inter connecting waveguide shall not exceed 1.2:1 throughout the specified frequency range, when the antenna is radiating into free space.

Gain - As a design objective each antenna radiator shall be capable of 40 db gain over that which can be theoretically obtained from an isotropic radiator fed with the same input power.

Data - Antenna pattern measured data shall be provided for each antenna.

Antenna Pod - Each antenna shall be mounted in a cylindrical pod 12 feet long and 26 inches in diameter. Each antenna shall be strain isolated from its pod.

- 3 -

Pod Construction - Each pod shall consist of a sleeve 26 inches in diameter with a spider bulkhead at each end. Each spider shall have a shaft projecting from its center. The pod shall be installed in the aircraft by inserting the spider shafts in self aligning bearings which shall be mounted in the tapered fairing at each end of the pod installation on the aircraft.

Sleeve - Each sleeve shall be constructed of aluminum skin and aluminum core honeycomb except over the radar window. The honeycomb structure shall be 1 inch thick and cover 230 degrees of the cylindrical sleeve.

Radome - Each sleeve shall have 130 degree cylindrical shaped radome over its radar window.

Roll Stabilization - Each pod shall have the necessary linkage on its shafts for \pm 10 degree roll stabilization. Mechanical and electrical components for roll stabilizing both pods shall be provided.

Actuators - Hydraulic actuators with associated cranks and mounting provisions shall be supplied.

Hydraulic System - Hydraulic power will be available from the airplane system.

Position Pickoffs - Position pickoffs shall be provided.

Dual Channel Electronic Servo Amplifier - A dual channel electronic servo amplifier shall be provided. (No gyroscope will be included since the roll signal will be available from the aircraft instrument system.)